WASTE STREAM	3Z202	AGR Fuel Transport Flasks

SITE Flasks & Flatrols

SITE OWNER EDF Energy Nuclear Generation Ltd (EDFE NGL)

WASTE CUSTODIAN EDF Energy Nuclear Generation Ltd (EDFE NGL)

WASTE TYPE LLW

WASTE VOLUMES

		Reported (m^3)
Stocks:	At 1.4.2025	= 0
Future arisings:	1.4.2025 - 31.3.2028	= 0
	1.4.2028 - 31.3.2038	= 470.3
Total future arisings:		**470.3**
Total waste volume:		**470.3**

OR

Conditioned (m^3)	Packaged (m^3)

Number of waste packages in stock: At 1.4.2025…… - packages

Comment on arising rates: Arisings are not constant as waste is expected to arise during flask decommissioning following AGR defuelling.

Additional information on quantities: Arisings are from 37 off A2 flasks. The flasks are assumed to be in service to the end of AGR station defuelling. A further 8 off A2 flasks are on standby to deploy into service if the demand requires it. However, it is not known if they will be utilised and how many, so have not been included in the above arisings volume.

Uncertainty factors on volumes:

Stock (upper):	x -	Arisings (upper):	x 1.50
Stock (lower):	x -	Arisings (lower):	x 0.50

WASTE SOURCE A2 flasks that have been used for transporting irradiated AGR fuel.

PHYSICAL CHARACTERISTICS

General description: A2 Flask - Steel construction of overall dimensons 2.56m x 2.15m x 2.31m. Internal cavity is 1.66 m³. Flasks weigh 49.7 t, and have a volume of 12.71 m³ each.

Changes since waste generated: -

Bulk density (t/m³): = 3.9

Comment on density: Volume quoted for arisings is an envelope volume for the the empty flask and as such density accounts for the internal space.

CHEMICAL COMPOSITION

General description and components (%wt): Steel A2 Flasks. Flask surfaces are painted with an epoxy based paint and there is a seal made of viton. Steel (~99.9%), Viton (<0.01%) and epoxy based paint (~0.1%).

Chemical state: Neutral

Sheet metal proportion / thickness: Metal present as massive pieces. A2 flask - wall thickness of 340mm.

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel……	= 0	-	
Other ferrous metals……	~ 99.9	-	
Iron……	= 0	-	
Aluminium……		-	
Beryllium……		-	
Cobalt……		-	
Copper……		-	
Lead……	0	-	
Magnox/Magnesium……	= 0	-	
Nickel……		-	
Titanium……	= 0	-	
Uranium……		-	
Zinc……	= 0	-	
Zircaloy/Zirconium……	= 0	-	
Other metals……	= 0	-	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulosics	= 0	-	
Paper, cotton	= 0	-	
Wood	= 0	-	
Halogenated plastics	= 0	-	
Total non-halogenated plastics	= 0	-	
Condensation polymers	= 0	-	
Others	= 0	-	
Organic ion exchange materials	= 0	-	
Total rubber	< 0.01	-	
Halogenated rubber	< 0.01	-	
Non-halogenated rubber	= 0	-	
Hydrocarbons	= 0	-	
Oil or grease		-	
Fuel		-	
Asphalt/Tarmac (cont.coal tar)		-	
Asphalt/Tarmac (no coal tar)		-	
Bitumen		-	
Others		-	
Other organics	~ 0.10	-	

Other materials (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials	= 0	-	
Inorganic sludges and flocs	= 0	-	
Soil	= 0	-	
Brick/Stone/Rubble	= 0	-	
Cementitious material	= 0	-	
Sand	= 0	-	
Glass/Ceramics		-	
Graphite	= 0	-	
Desiccants/Catalysts	= 0	-	
Asbestos	= 0	-	
Non/low friable		-	
Moderately friable		-	
Highly friable		-	
Free aqueous liquids	= 0	-	
Free non-aqueous liquids	= 0	-	
Powder/Ash	= 0	-	

COMPONENTS OF MATERIALS, WASTE PROPERTIES, MATERIALS NOT CONTRIBUTING TO MASS

Inorganic anions (%wt):

	(%wt)	Type(s) and comment
Fluoride	= 0	-
Chloride	= 0	-
Iodide	= 0	-
Cyanide	= 0	-
Carbonate	= 0	-
Nitrate	= 0	-
Nitrite	= 0	-
Phosphate	= 0	-
Sulphate	= 0	-
Sulphide	= 0	-

Materials of interest for waste acceptance criteria:

	(%wt)	Type(s) and comment
Combustible metals	= 0	-
Low flash point liquids	= 0	-
Explosive materials	= 0	-
Phosphorus	= 0	-
Hydrides	= 0	-
Biological etc. materials	= 0	-
Biodegradable materials	= 0	-
Putrescible wastes	= 0	-
Non-putrescible wastes	= 0	-
Corrosive materials	= 0	-
Pyrophoric materials	= 0	-
Generating toxic gases	= 0	-
Reacting with water	= 0	-
Higher activity particles	= 0	-
Soluble solids as bulk chemical compounds	= 0	-

Hazardous substances / non hazardous pollutants: -

	(%wt)	Type(s) and comment
Acrylamide	NE	-
Benzene	NE	-
Chlorinated solvents	NE	-
Formaldehyde	NE	-
Organometallics	NE	-
Phenol	NE	-
Styrene	NE	-
Tri-butyl phosphate	NE	-
Other organophosphates	NE	-
Vinyl chloride	NE	-
Arsenic	NE	-
Barium	NE	-
Boron	NE	-
Boron (in Boral)	NE	-
Boron (non-Boral)	NE	-
Cadmium	NE	-
Caesium	NE	-
Selenium	NE	-
Chromium	NE	-
Molybdenum	NE	-
Thallium	NE	-
Tin	NE	-
Vanadium	NE	-
Mercury compounds	NE	-
Others	NE	-

Complexing agents (%wt): No

	(%wt)	Type(s) and comment
EDTA	NE	-
DPTA	NE	-
NTA	NE	-
Polycarboxylic acids	NE	-
Other organic complexants	NE	-
Total complexing agents	= 0	-

Physical components:

	Number	Type(s) and comment
Sources		-
Electronic & Electrical Equipment (EEE)		-
EEE Type 1		-
EEE Type 2		-
EEE Type 3		-
EEE Type 4		-
EEE Type 5		-

TREATMENT, PACKAGING AND DISPOSAL

Planned on-site / off-site treatment(s):

Treatment	On-site / Off-site	Stream volume %
Size reduction		
Decay storage		
Low force compaction		
Supercompaction (HFC)		
Incineration		
Drying/dewatering/liquid separation		
Tie down/fixatives/strippable coating/painting application		
Decontamination	Off-site	= 95.0
Metal treatment	Off-site	= 95.0
Recycling / reuse		
Thermal treatment, including vitrification		
Encapsulation		
Polymer encapsulation		
Other physical treatment		
Other chemical treatment		
Containerisation		
Treatment not yet determined		
None	Off-site	= 5.0

Comments on planned treatments: Details of flask decommissioning process yet to be finalised. Flasks are expected to be capable of being decontaminated with the majority (~95%) being suitable for free release/recycling.

Conditioning method: -

Conditioning plants:

Plant Name	Location

Likely conditioning matrix: -

Further information on the conditioning matrix: -

Waste Packaging:

Likely container type:

Container	Waste packaged (vol%)	Waste loading (m^3)	Payload (m^3)	Number of packages	Estimated start date for packaging
1/2 Height IP-2 Disposal/Re-usable ISO (TC01/TC02)	5.0	10.0	18.3	3	-

Range in container waste loading:

Other information on packaging and conditioning: Expected that decommissioned flasks will be dispatched to an off-site facility for decontamination/treatment and disposal.

Conditioned density (t/m^3): -
Conditioned density comment: -

Management Routes:

Disposal Route	Stream volume %	Raw density t/m^3	Start date
Expected to be consigned to a Near Site, Near Surface Disposal Facility (Scotland)			
Expected to be Non-NSD HAW managed under Scottish Government's policy			
Expected to be disposed to LLW Vaults NRS Dounreay			
Expected to be consigned to the Geological Disposal Facility			
Expected to be consigned to a Near Surface Disposal Facility			
Expected to be consigned to the LLW Repository	= 5.0		
Expected to be consigned to a Landfill Facility			
Expected to be disposed On-Site			
Expected to be managed by In-Situ Disposal			
Expected to be consigned to an Incineration Facility			
Expected to be consigned to a Metal Treatment Facility	= 95.0		
Expected to be Out of Scope			
Expected to be recycled / reused			
Disposal route not known			

Classification codes for waste expected to be consigned to a landfill facility:

Opportunities for alternative disposal routing: No

Baseline Management Route	Opportunity Management Route	Stream volume (%)	Opportunity Confidence	Comment
-	-	-	-	-

RADIOACTIVITY

Source: Residual contamination of fuel flasks.

Uncertainty: Activity values are current best estimates. Any waste is expected to be LLW, levels of contamination have to be determined.

Measurement of radioactivities: Theoretical assessment.

Chemical form of radionuclides:

H-3: -
C-14: -
Cl-36: -
Se-79: -
Tc-99: -
I-129: -
Ra: -
Th: -
U: -
Np: -
Pu: -

WASTE STREAM **3Z202** **AGR Fuel Transport Flasks**

Nuclide	Mean radioactivity, TBq/m³ Waste at 1.4.2025	Bands and Code	Future Arisings	Bands and Code	Nuclide	Mean radioactivity, TBq/m³ Waste at 1.4.2025	Bands and Code	Future Arisings	Bands and Code
H 3				8	Gd 153				
Be 10				8	Ho 163				
C 14				8	Ho 166m				
Na 22				4	Tm 170				
Al 26				4	Tm 171				
Cl 36				8	Lu 174				
Ar 39					Lu 176				
Ar 42					Hf 178n				
K 40					Hf 182				
Ca 41				8	Pt 193				
Mn 53					Tl 204				
Mn 54			1.00E-06 C C	2	Pb 205				
Fe 55				6	Pb 210				8
Co 60			1.00E-05 C C	2	Bi 208				
Ni 59				6	Bi 210m				
Ni 63				6	Po 210				8
Zn 65				8	Ra 223				
Se 79				6	Ra 225				
Kr 81					Ra 226				8
Kr 85					Ra 228				
Rb 87					Ac 227				
Sr 90			1.00E-06 C C	2	Th 227				
Zr 93				6	Th 228				
Nb 91					Th 229				8
Nb 92					Th 230				8
Nb 93m				6	Th 232				6
Nb 94				6	Th 234				
Mo 93				6	Pa 231				8
Tc 97					Pa 233				
Tc 99				6	U 232				
Ru 106			1.00E-08 C C	2	U 233			1.00E-09 C C	2
Pd 107				6	U 234			2.00E-07 C C	2
Ag 108m				6	U 235				8
Ag 110m					U 236				6
Cd 109					U 238			1.00E-07 C C	2
Cd 113m					Np 237			2.00E-08 C C	2
Sn 119m					Pu 236				
Sn 121m				6	Pu 238			2.00E-08 C C	2
Sn 123					Pu 239			1.00E-07 C C	2
Sn 126				6	Pu 240			1.00E-07 C C	2
Sb 125					Pu 241			5.00E-06 C C	2
Sb 126					Pu 242				6
Te 125m					Am 241			2.00E-07 C C	2
Te 127m					Am 242m				6
I 129				8	Am 243				6
Cs 134			6.00E-08 C C	2	Cm 242			3.00E-08 C C	2
Cs 135				6	Cm 243				6
Cs 137			3.00E-06 C C	2	Cm 244				6
Ba 133					Cm 245				8
La 137					Cm 246				8
La 138					Cm 248				
Ce 144				6	Cf 249				
Pm 145					Cf 250				
Pm 147				6	Cf 251				
Sm 147					Cf 252				
Sm 151				6	Unsp a				8
Eu 152				6	Unsp b/g			1.00E-09 C C	2
Eu 154				6	**Total a**		**0** *	**7.71E-07**	*
Eu 155				6	**Total b/g**		**0** *	**2.01E-05**	*

Bands (Upper and Lower)
A a factor of 1.5
B a factor of 3
C a factor of 10
D a factor of 100
E a factor of 1000

Note: Bands quantify uncertainty in the mean radioactivity.

Code
1 Measured activity
2 Derived activity (best estimate)
3 Derived activity (upper limit)
4 Not present
5 Present but not significant
6 Likely to be present but not assessed
7 Present in significant quantities but not determined
8 Not expected to be present in significant quantity
* Total calculated from the 114 declared radionuclides